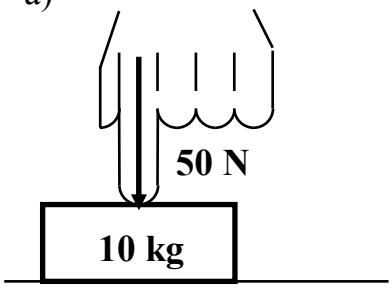
The Force Of Friction

As you know, friction is a force that always acts to oppose the motion of an object that creates it. This force always acts parallel to the surface upon which an object is perched, and depends on the following two factors:

1. the pressing normal force that exists between object-and-surface. Simply put, if the object is pressed more to the surface, there will be more friction to oppose the object's motion.

   To see how the normal force is a "pressing" force, consider what happens to the normal force $\mathbf{F_N}$ in each of the following situations:

   a)

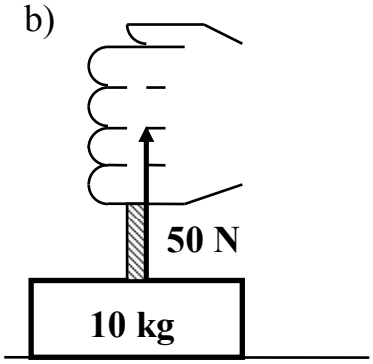
   

   → a **50 N** force pushes down on a 10 kg mass resting on a horizontal surface
   → $\mathbf{F_N}$ will therefore be ***greater*** than $\mathbf{F_g}$:

   →$F_g + 50 = F_N$ →$10(9.8) + 50 = F_N$

   →$F_N = 148$ N

   b)

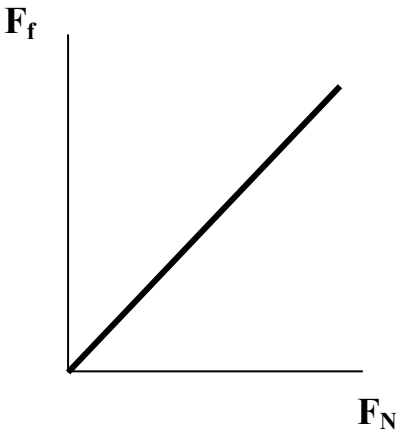
   

   → a **50 N** force pulls up on a **10 kg** mass resting on a horizontal surface; the force is not large enough to lift the object off the surface
   →$\mathbf{F_N}$ will now be ***less*** than $\mathbf{F_g}$:

   →$F_g = F_N + 50$ →$10(9.8) - 50 = F_N$

   →$F_N = 48$ N

2. The nature of the materials in contact with each other.
   - This refers to the type of materials, and how slippery they are when in contact. For example, there is more friction between rubber and asphalt than between rubber and ice. The friction is even greater is the asphalt is rough, instead of smooth.
   - This quantity is described as the *coefficient of friction*, 'μ', and can be determined graphically by comparing $\mathbf{F_f}$ vs. $\mathbf{F_N}$:



→slope '**k**' is the coefficient of friction μ

→the equation is $\boxed{F_f = \mu F_N}$

Make sure you determine the normal force before using this equation to find friction force. As was shown, F_N isn't always equal to an object's weight F_g!